Integrating sustainability into manufacturing is a multifaceted endeavour. Global sustainability aspects and specific manufacturing success factors have to be combined with life cycle thinking in order to get the holistic view on manufacturing which is needed to make truly sustainability-oriented decisions in manufacturing. Industry, at the same time, is always deterred by possible high cost and time constraints related to implementing new approaches. Using examples from car manufacturing, this paper introduces and explains a new sustainable manufacturing framework - the Sustainability Cone - as the missing link which closes these gaps by providing necessary holistic and consistent overview while being aligned with established stage-gate project execution models, thus ensuring practical applicability as shown for a highly automated production cell. The paper shows how to apply life cycle target thinking, as essential part of the Sustainability Cone, derived from customer-demanded functionality down to a production system.